PATRICK D. McGOWAN
HENNEPIN COUNTY SHERIFF
ROOM 6 COURTHOUSE
350 SOUTH FIFTH STREET
MINNEAPOLIS, MN 55415

(612) 348-3740
FAX 348-4208



OFFICE OF THE SHERIFF

**Before the**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, D.C. 20554**

| | | |
|---|---|---|
| In the Matter of | ) | |
| | ) | |
| The Development of Operational, | ) | |
| Technical, and Spectrum | ) | WT Docket No. 96-86 |
| Requirements for Meeting | ) | |
| Federal, State and Local Public | ) | |
| Safety Agency Communication | ) | |
| Requirements Through the | ) | |
| Year 2010 | ) | |

**Comments of the**
**OFFICE OF THE HENNEPIN COUNTY SHERIFF**
**Sheriff Patrick D. McGowan**
**Room 6 Courthouse**
**Minneapolis, MN 55415**

**September 10, 1996**

TABLE OF CONTENTS

## I. INTRODUCTION

1. Hennepin County is a moderately large local governmental body with a county work force of over 11,000 and an annual operating budget in excess of $1.2 billion. With a total county population of over 1 million, including the county seat of Minneapolis, Hennepin is one of the larger counties in the nation. The constantly increasing reliance by the County on an expanding wireless telecommunications system to effectively and efficiently provide public safety services to its citizens, coupled with serious concern regarding the intentions or ability of the Federal Communications Commission to adequately meet urgent operational, technical and spectrum needs of state and local governments through its regulatory processes, necessitates these comments by the Office of the Hennepin County Sheriff to WT Docket No. 96-86, submitted pursuant to the procedures set forth in 47 C.F.R. §§ 1.415 and 1.419.

## II. BACKGROUND

### A. History of Public Safety Communications in Hennepin County

2. The Hennepin County Sheriff's Office was an early pioneer in the practical application of two way radio for public safety use. The Federal Communications Commission issued the Hennepin County Sheriff's Office its initial Radio Station Construction Permit for a municipal police radio station, FCC assigned call sign KANN, on January 22, 1942.[1]

3. The Hennepin County Sheriff is charged with administering the planning, budgeting, design, procurement, installation, maintenance and operation of all radio communications systems owned by Hennepin County.[2] The radio system used by the County has grown from a single "39,900 kc special frequency modulated" Motorola FST-250 base station and 12 porta-mobiles originally licensed in 1942 to over 5,500 voice and data radios operating today on over 90 VHF, UHF and 800 MHZ frequencies, supported by three major dispatch centers. While the system has steadily grown and been modernized to keep up with increasing demand, the system is not without serious technical and operational problems. The current county radio system infrastructure has been characterized as:

a. Obsolete and subject to unavoidable major failure;
b. Not capable of keeping up with increased demands for "air time" utilization;
c. Not capable of using new, efficient technologies;
d. Not capable of supporting response to a major mass casualty or disaster situation such as occurred in Oklahoma City; and

---

[1] Reference FCC file numbers T4-PP-4464 and T4-PP-4465, January 22, 1942, signed by T. J. Slowie, FCC Secretary.

[2] See Minn. Stats. § 383B.255; and Hennepin County Board Resolution No. 96-3-0172.

e. Not effective for increased "mutual aid" and joint public safety agency initiatives.[3]

**B. Current Wireless System Planning and Developments**

4. Other state, regional and local governments in the Twin Cities Metropolitan Area[4] (TCMA) have reported similar technical and operational problems for several years. This common need led to the Metropolitan Council of the Twin Cities being asked in 1990 to consider facilitating a regional planning effort to explore the technical and economic feasibility of a multi-county regionwide 800 MHZ trunked network to be shared by all levels of government. As a result of four years of regional planning, the 1995 Minnesota State Legislature enacted a Bill that established the Metropolitan Radio Board as an independent political subdivision to oversee planning, implementation, and operation of the first phase of a nine county regionwide 800 MHZ shared public safety radio communications system, and provided initial funding for its construction.[5] The first phase is the initial backbone of the regionwide system that will serve state and regional agencies, emergency medical services, and mutual aid communications. The seven TCMA counties and the two first class cities of Minneapolis and St. Paul each have the option to add subsystem enhancements to the first phase backbone to serve their internal day to day operations.

5. The Hennepin County Board of Commissioners has budgeted $29.3 million to add a county subsystem to the initial first phase system, to be constructed by the Sheriff's Office in conjunction with the first phase during the next two years. The Hennepin County subsystem is intended to provide voice communications capacity for all county operations and the operations of forty four of the forty seven suburban municipalities located within the County.[6] The City of Minneapolis is budgeting approximately $15 million to add a city subsystem, also to be constructed in conjunction with the first phase. The remaining six counties and the City of St. Paul are completing communications plans for submittal to the Metropolitan Radio Board regarding their option to join the system at a future date.[7] Once the Commission allocates

---

[3] See 800 MHZ Communications Plan for Hennepin County Minnesota, as Adopted by the Hennepin County Board of Commissioners on March 26, 1996, and Approved by the Metropolitan Radio Board on June 28, 1996, Introduction, page 1.

[4] Contiguous Minnesota counties of Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington.

[5] See Minnesota Laws 1995, Chapter 195.

[6] See 800 MHZ Communications Plan for Hennepin County Minnesota, as Adopted by the Hennepin County Board of Commissioners on March 26, 1996, and Approved by the Metropolitan Radio Board on June 28, 1996, Budgetary Notes, page 7.

[7] See Local Planning Requirements, Minn. Stats. § 473.904.

suitable spectrum for high speed video capable mobile data transmission systems, the County plans to budget several million dollars for replacement of its aging mobile data communications system consisting of approximately 380 terminals operating at a data rate of 4.8 kps on ten base stations using five general category 800 MHZ channels. This system has reached maximum capacity transacting short text status and information files and cannot be migrated to a video capable system.

## III. DISCUSSION OF WT DOCKET NO. 96-86

### A. Definition of Public Safety

6. I concur with the Commission's proposal to adopt the public safety definitions being considered by Public Safety Wireless Advisory Committee (PSWAC). However, the broad definition proposed is subject to various interpretations. For example, what is the difference between "essential public services" and "maintaining basic infrastructure", such as roads and bridges. One is considered public safety while the other is considered public service. Whatever definition is ultimately used, local governments should not be required to construct separate systems on separate frequencies for their various internal public safety and public service operations. This has been one of the catastrophic effects with the Commission's historical partitioning of the public safety and special emergency radio services into seven distinct services, each with different frequencies and eligibility rules. Further, it is essential that the decision authority to determine who may use a local government owned and operated communications system be left in the hands of the responsible local government agency. To insure this level of local control regarding appropriate use, the provisions of 47 C.F.R. § 90.421,[8] should be revised to encompass the forthcoming definition of public safety, and be expanded to include control points and all station classes.

### B. Interoperability Issues

7. I concur with the PSWAC proposed definitions of interoperability and the Commission's identification of interoperability needs. I do have specific comments on the interoperability options presented in WT 96-86.

8. The infrastructure dependent links discussed included integrated regional and statewide networks shared by multiple agencies, which can provide very high levels of intercommunication among diverse users. Essentially, if an entire region or state elects to share a common wide area network utilizing standardized technology, interoperability among users is realized as a result of being on the same network. However, gaining the consensus and funding for a shared regionwide or statewide integrated network is difficult and protracted. For example, the first phase of the TCMA 800 MHZ regionwide system, scheduled to be constructed in the

---

[8] Provides that mobile radios may be installed in mobile units not under the control of the licensee when specified categories of coordination with the licensee are required.

1998 to 1999 time frame, has been in the planning and budgeting stages since late 1988. Potential participant agencies must stagger their joining of the system for many years due to severity of need, amortization schedules for recently acquired systems, budgeting limitations, etc.

9. The application of cross band repeaters and more sophisticated "cross technology" infrastructure dependent links requires that the infrastructure on all sides of the link be designed to provide reliable talk out and talk back coverage to portable radios. This can be technically challenging and very cost intensive, particularly in an urbanized area due to building clutter and penetration losses. In addition, unless dedicated interoperability systems are used, infrastructure links can only be used on demand for emergencies in order to reduce overloading infrastructure capacities by unnecessarily translating routine traffic. This results in complicated, slow and confusing procedures necessitating intervention by multiple dispatch points to establish a link between mobile units. It is my opinion, based on the extensive experience of my Communications Division in developing and utilizing cross band and cross technology infrastructure links, that primary reliance on these links is not a timely or complete solution for interoperability given the costs, extended implementation schedules, operational complexities and performance related issues.

10. I find that the Commissions's concept of potentially relocating all public safety communications to a new band, coupled with the suggestion that this would present opportunities for commercial systems to offer solutions to the interoperability and capacity problems experienced by public safety licensees, absent supporting data or arguments, represents an impractical and unsound idea that demonstrates why I am deeply concerned regarding the intentions or ability of the Federal Communications Commission to adequately understand and address the needs of state and local governments.

11. The proposal to designate universal mutual aid channels, both simplex and paired repeater channels, is well founded and is a step toward improved interoperability that could be taken in the near term. Within the Commission's current rules providing for state or local option to establish mutual aid frequencies by plan or mutual consent, many areas have adopted service specific mutual aid channels such as 155.475 MHZ for law enforcement, 155.340 MHZ for EMS, 154.295 MHZ for fire, etc.[9] The problem with these frequencies is that they are service specific and can be quickly overloaded during multiple emergency situations. The designation of five conventional interoperability channels in the NPSPAC 821-824/866-869 MHZ band provides for limited interoperability among agencies utilizing non-compatible proprietary 800 MHZ trunked

---

[9] See 47 C.F.R. §§§ 90.19(d)(14), 90.21(b)(2), and 90.27(b)(5). See also Minnesota Fire Frequency Utilization Plan, Minnesota Department of Transportation, January, 1978; and State of Minnesota Emergency Medical Services Radio Communications Plan, Minnesota Department of Health, January, 1995.

radio systems.[10] However, funding and construction of fixed facilities providing adequate portable radio coverage for infrastructure links on these NPSPAC mutual aid frequencies has been problematic. Simplex communications on these NPSPAC frequencies is limited to immediate scene of action operations and users must switch away their normal trunked radio system and any infrastructure dependent links and become isolated from their primary system.

12. I support the concept of multiple universal intergovernmental mutual aid channels, and suggest that a minimum level of mandated eligibility, prioritization, and other usage restrictions, such as service type, should be imposed. Simple common sense rules should be established such as using "plain English" in lieu of 10 codes or other non-standard jargon, control point channel watch requirements for designated calling/distress channels, safety of life or property emergencies take priority over non-emergencies (e.g. drills or itinerant traffic), secondary internal agency use permitted only during failures of normal communications facilities, etc. One important regulatory requirement would be to designate standardized "names" for universal channels that would be used on a nationwide basis to avoid user confusion. To demonstrate this need, the VHF police service frequency available for nationwide intersystem use (155.475 MHZ) is not used in all states and many states use different names including MINSEF, WISPERN, ILEEN, NLEEF, AID, etc. Further, any licensee in the public safety radio services, U.S. Federal government agencies, the U.S. military, and state national guard units should be automatically permitted to operate mobile and portable stations on these channels nationwide for emergency or itinerant mutual aid use without additional authorization requirements.

13. I would support and encourage a type acceptance requirement for mandatory inclusion of whatever new dedicated mutual aid channels would be allocated for public safety interoperability, along with incorporating the five NPSPAC mutual aid channels. Although not within the Commission's regulatory authority, I believe that U.S. Federal Government radios should also be required to incorporate provisions for universal mutual aid channels. However, if a type acceptance requirement were applied only to the public safety radio service, and not all Part 90 private radio services and Federal Government radios, the cost implications of requiring multi-band radios solely for this purpose would likely be problematic for public safety due to creating a nitch market. Some public safety licensees could be motivated to purchase non-public safety radios due to costs, and the intended purpose to improve interoperability would be defeated to a large degree. I concur that the amateur radio service has demonstrated the technical feasibility of manufacturing and operating low to moderate cost multi-band radios, and deduce that a type acceptance requirement, with appropriate lead times, for all Part 90 and U.S. Government radios should not be a problem for manufacturers or users.

---

[10] National Public Safety Calling Channel and four common Tactical Channels recommended by the National Public Safety Planning Advisory Committee in its Final Report to the FCC, September 9, 1987, page 6.

## C. Operational Issues

14. The traditional mode of wireless communications utilized by public safety agencies has been two way voice radio. Two way dispatch and enhanced dispatch voice communications remains the predominant and highest priority operational mode of communications for public safety. Additional modes of wireless communications currently in use by the Hennepin County Sheriff's Office include: transaction processing, limited decision support, and point to multi point fixed data service for community warning siren control.

15. Three fundamental system requirements unique to public safety which are not offered by commercial systems include: pervasive inside building coverage, complete immunity from serious system degradation, and sufficient capacity to handle peak traffic during multiple emergencies and extraordinary events. These basic high performance needs result in increased infrastructure costs for public safety systems when compared to non public safety systems or commercial systems of comparable size and scope.

16. Real time operational requirements, along with increasing pressure to improve efficiencies and productivity are demanding the implementation of additional wireless applications in the near future including: enhanced dispatch, wide area linking/roaming, facsimile, vehicle location, route guidance, snapshot imaging, still video, and motion video. These applications will require new systems operating on frequencies other than those currently licensed to the County for voice communications. Proceeding with timely implementation of many of these technologies has been stifled due to the complete absence of spectrum licensable to public safety agencies for these services and for manufacturers to design new advanced private land mobile products around.

## D. Technology Issues

17. I understand and concur with the Commission's general practice of providing an environment in which public safety licensees have reasonable flexibility to choose from a range of technologies to support their respective operational requirements. However, I also note and strongly concur with the Commission's recognition that mandating specific technologies may be necessary in order to promote important regulatory goals including interoperability between public safety agencies and achieving the use of more efficient technologies. Specific technologies and formats have been mandated to a greater degree in other Special and Safety Radio Services such as the Maritime and Aviation Services,[11] along with the Broadcast Radio Services. The technology neutral regulatory approach in the Private Land Mobile Radio Services has enabled a growing plethora of divergent, and usually non-compatible proprietary schemes often posing confusing and financially burdensome choices to public safety licensees. The "hands off" regulatory approach to specifying technologies may be very appropriate for certain services such as Amateur Radio, Public Mobile Radio, and in granting experimental or

---

[11] See Parts 80 and 87 of the Commissions's Rules.

developmental licenses. However, those radio services directly supporting the protection of life and property, and particularly those funded by taxpayer dollars, in our opinion, are not well served by this hands off approach. I believe that the public's interest may be better served by a more restrictive approach by the Commission in specifying at least a narrower range of type accepted technologies in the Public Safety Radio Services, particularly for digital systems.

**E. Spectrum Allocation**

18. I agree that many public safety licensees are not currently making the most efficient use of the spectrum allocated to them. Fragmented stand alone conventional systems scattered among various bands are unfortunately all too common. However, I believe that the principle reason for the development of this situation is due to the disjointed and piece meal regulatory environment established by the Commission over the decades. Antiquated regulations regarding the allocation and use of discrete spectrum segments and channel assignments has inhibited the development of efficient integrated systems and the use of newer technologies, particularly on frequencies below 512 MHZ. The historical partitioning of public safety frequency management and allocation responsibilities between the FCC for state and local use and the National Telecommunications and Information Administration (NTIA) and the Federal Interagency Radio Advisory Committee (IRAC) for U.S. Government agency use has further prevented achieving the most effective use of available spectrum for public safety.

19. A rapidly developing technology that will required additional spectrum allocations to public safety in the next one to three years will be the application of high speed data transmission (256-384 kbps or faster) to support transfer of photographs, still video, slow motion video, fast motion video, fingerprint images, decision support, real time vehicle tracking, large file transfer, etc. Current spectrum and existing data systems operating at speeds up to 19.2 kps, typically on 25 kHz wide channels at 450 or 800 MHZ will not support these faster data rates for at least two reasons. First, in the major metropolitan areas, all or nearly all 450 and 800 MHZ channels are in use by incumbent licensees for existing voice and data systems. Even if individual channels were available, it would be nearly impossible to aggregate several contiguous 25 kHz channels into a single very wide bandwidth channel capable of supporting 256-384 kbps or faster data, particularly given the narrowband rechannelizing plan for frequencies below 512 MHZ contained in the Commission's recent "refarming docket". Due to these considerations, along with the fact that these high speed data systems will require entirely new systems, the need for spectrum contiguous to existing public safety allocations does not appear to be a requirement for this application. However, use of frequencies above 2000 MHZ for wide area mobile and portable operations poses problems in system design and costs due to difficult propagation characteristics. I would recommend the Commission give serious consideration to reallocation of one or more contiguous segments of the frequency bands between 1390 and 1755 MHZ identified in WT Docket No. 96-86 for this purpose.

20. Voice communications remains the predominant application used by public safety. Absent the availability of multi-band radios in the near future, any spectrum reallocated to public safety needs to be contiguous, or semi-contiguous to existing public safety allocations in order to be able to expand or augment existing systems with compatible equipment. Non-contiguous

allocations would require total system replacement, multiple radios, parallel systems, etc., and would further exacerbate the interoperability problem and increase costs. The discussion of potential contiguous or semi-contiguous spectrum for reallocation in WT 96-86 included portions of bands such as 174-216 MHZ, 335-400 MHZ, and 470-512 MHZ. I support the reallocation of these band segments, particularly permitting immediate sharing of the 470-512 MHZ television broadcast band with land mobile use throughout the country, since it is contiguous to the 450-470 MHZ band. I also support coordination, sharing, pooling and joint system development utilizing VHF and UHF allocations between Federal and non-federal agencies.

21. Hundreds of millions of dollars have been invested by public safety agencies in constructing 800 MHZ analog and digital trunked radio networks, the most efficient technology in common use. None of the band segments identified in WT 96-86 for potential reallocation are compatible with these 800 MHZ systems. The larger metropolitan areas have exhausted the supply of 800 MHZ channels, including the 821-824/866-869 MHZ NPSPAC channels, creating a situation of multi-million dollar public safety systems at full capacity with no room for expansion. The Commission's recent proposal to reallocate the general category channels (808-809.750/851-854.750) to the SMRS, on top of its slow response in suspending inter-category sharing of the seventy 800 MHZ public safety channels until after commercial interests had exhausted many of these channels, has resulted in a serious problem for additional development or expansion of these efficient 800 MHZ trunked systems by public safety entities.

22. Since there are no unassigned paired 45 MHZ offset channel segments contiguous to the 806-824/851-869 band, the options appear to be limited for expansion of existing public safety systems operating in this band. The best and most immediate option to providing expansion capacity within the existing 806-821/851-866 band may be to begin licensing the 12.5 kHz offset channels in between the existing 25 kHz channels, utilizing geographic separation to avoid adjacent channel interference. Technical approaches similar to that taken either with the NPSPAC 821-824/866-869 subband or the "refarming" approach to frequencies below 512 MHZ could be used. Ultimately, it is my opinion that rechannelizing/refarming the 800 MHZ band to narrowband assignments, while permitting some limited aggregation of contiguous narrowband channels for use of other efficient technologies will be required.

23. Another option would be to reallocate to public safety all or a portion of television channels 68 and 69 (794-806 MHZ) with a 6 MHZ separation between transmit and receive channel assignments. These or another combination of UHF television channels 60 to 69 could be used for new or relocated stand alone public safety voice and data applications, and might be used for limited expansion of existing 800 MHZ systems. However, there would be significant technical challenges with engineering of fixed site antenna and filtering systems due the close spacing of transmit to receive channels both within this subband and with the existing band. I strongly urge the Commission to prioritize the development of a specific plan to address the need for additional channels at 800 MHZ due to the very large investments made and the heavy reliance on existing systems in this band.

## F. Transition

24. One key challenge to transition is that the implementation of new spectrally efficient digital technologies capable of providing advanced services to public safety are generally incompatible with existing analog systems. An all at once "cut over" from a large existing analog system to a new large digital system is essentially impossible due to budgetary constraints, technical complexities and the operational imperative that existing systems not be interrupted until the new system is fully commissioned and utilized. This results in the need to "over build" any new system on top of the existing infrastructure and operate both systems in parallel for a period of time ranging from several months to several years depending on how fast the old system can be vacated. This need for extended parallel operation is particularly true when implementing a wide area integrated network to be shared by a large number of independent agencies since budgeting cycles and operational needs are staggered. In effect, the old system has to stay on line until the last user can migrate off it. The implication is that those frequencies utilized in current systems generally cannot be used for replacement systems without causing serious operational and budgetary problems.

25. The use of commercial radio services to augment private systems by public safety agencies is becoming commonplace. Common carrier paging and cellular telephone service for administrative and non emergency operations provides some relief to overcrowded dispatch oriented private radio systems. These services have been shown to incrementally improve productivity and efficiency for administrative government operations. It is generally impractical for public safety to fund and construct comparable infrastructures for their internal administrative paging and PSTN interconnected needs. However, commercial radio services cannot serve as a substitute for private systems. Commercial systems do not meet the basic mission critical communications needs of public safety agencies and therefore cannot be expected to play any significant role in a technology transition plan for emergency communications systems.

## G. Competition in the Supply of Goods and Services

26. I believe that the Commission's historical hands off regulatory approach to establishing technical standards in the private land mobile radio services, particularly concerning adopting voice and data protocols for the 800 MHZ public safety bands, may have produced an illusion of widespread technical innovation and inadvertently enabled the current market concentration and lack of competition. Along with locking public safety agencies to a single vendor for all system MACs (moves, additions and changes) and therefore inflating system costs, the Commission's approach has stifled interoperability and indirectly caused many of the operational difficulties experienced by public safety agencies. Public safety communications managers must commit their agencies to fifteen to twenty year exclusive vendor relationships and are in the difficult position of having to choose from a grab bag of complex proprietary technologies generally incompatible with each other. The "all or nothing" exclusive contract awards necessary for these proprietary systems have resulted in a hostile, contentious and litigious purchasing environment facing public safety agencies, which are routinely sued by unsuccessful vendors. This increases costs to public safety agencies and often delays implementation by months or even years due to vendor initiated legal maneuvering.

27. I totally reject the view by others that adoption by the Commission of one or more open architecture technical standards, such as the APCO 25 suite of standards, would stifle competition, innovation, interoperability, and spectrum efficiencies. Conversely, I have concluded that a requirement for openly developed, non-proprietary technical protocols by the Commission would open advanced system markets to smaller manufacturers, provide competition throughout the system life cycle for MACs, lower costs to public safety agencies, lead to reduced market concentration, provide relief to the contentious nature of the purchasing environment, drastically improve interoperability and mutual aid, and facilitate the deployment of interconnected wide area networks by diverse agencies, all without inhibiting technical innovation and continued development of more spectrally efficient technologies.

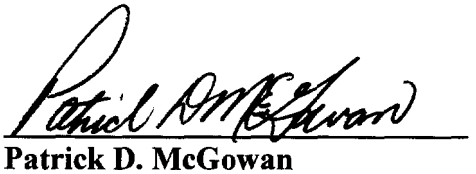
## IV. CONCLUSION

28. I recommend that the Commission take immediate steps to begin allocating additional spectrum for public safety use in two principal areas. First, allocations contiguous or semi-contiguous to current public safety allocations to provide expansion capacity for existing systems. Secondly, sufficient new allocations above 1000 MHZ to accommodate new high speed mobile data and video applications, along with additional allocations for fixed services. I urge the Commission to consider mandating specific standardized technologies and open protocols for new digital public safety systems that would provide for common over the air, inter-network interfaces, and interoperability gateways among various systems without restricting future technological innovation. I recommend that the Commission provide additional flexibility in the use of existing public safety allocations by reducing the number of individual public safety radio services into a common radio service with pooled frequencies. I further urge the Commission to cooperate with the NTIA and IRAC to facilitate an environment where state and local agencies can move toward jointly funded and operated shared systems with Federal agencies by pooling frequency assignments and other resources. I also recommend, as an interim step, that the Commission adopt several new universal mutual aid channels along with a type acceptance requirement to include these channels in all new public safety radios.

## V. CONTACT PERSON

29. For further information regarding these comments, contact Mr. Roger R. Laurence, Radio Communications Manager, Office of the Hennepin County Sheriff at (612) 348-5555.

**OFFICE OF THE HENNEPIN COUNTY SHERIFF**
**Room 6 Courthouse**
**Minneapolis, MN 55415**



**Patrick D. McGowan**
**Hennepin County Sheriff**